

Canal) from Asia to Europe. Add to this the inability of Canada's military (50th to 60th in size in the world) to monitor, protect, and defend the area adequately—especially given its sheer size (we have the world's longest coastline), extremely small population, and lack of infrastructure, as well as President Bush's draconian Presidential Directive on the Arctic of January 2009. All or some of these could combine to change the paradigm drastically. It remains to be seen whether a "soft-law" approach with compromise among the Arctic Council states will achieve a *modus vivendi* of sorts, or whether new treaty law will be necessary to regulate shipping, oil and gas development, and the like, or whether urgency for resources will cause some states to take matters into their own hands. But, at the end of the day, the question of whether Canada has effective control of the area and the ability to protect it remains the key issue. Some additional reference to this troubling issue would have strengthened the final section of Shelagh Grant's book. In addition, current demographic data for the Arctic, including the volunteer Inuit Canadian Rangers and other military personnel stationed there as well as local residents, would have helped readers to place the challenges in greater context. But *Polar Imperative* is primarily a work of history, and Grant has done a mighty fine and interesting job of it.

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DEEP FREEZE! A PHOTOGRAPHER'S ANTARCTIC ODYSSEY IN THE YEAR 1959. By ROBERT A. McCABE. New York: International Photography Publishers, 2010. ISBN 978-0-9843364-0-1. 147 p., map, b&w illus., photographer's note. Hardbound. US\$45.00.

My first thoughts on reading the title and skimming through the book related to why the author/photographer waited so long (50 years) to assemble photos he had taken while on assignment as a photo journalist in Antarctica in the year following the International Geophysical Year (IGY), 1957–58. However, the reason for publishing them soon became apparent: they are a valuable historical and pictorial record of the U.S. Navy presence in the early years of the establishment of U.S. stations. The book contains 86 black-and-white photos, along with text based on what the author dictated to his portable recorder at the time, amplified since with anecdotes and a few other informational items. Many books have been written about the IGY, when the United States and other countries constructed bases in Antarctica to conduct research. The need to continue and expand on those IGY research programs was soon realized, an international treaty was formed in 1959 and ratified in 1961, and the story continues in that regard to this day—Antarctica remains a continent for science, with a large contingent

of scientists from many countries engaged in a variety of research programs.

The photos and brief accompanying text are presented in chronological order, from the start of the author's journey at Andrews Air Force Base (AFB), Washington, D.C., on 30 October 1959. He traveled westward on a four-engine DC-6B (Military Air Transport Service, operated by the United States Navy) to Travis AFB, California, on to Hawaii, then Canton Island, and eventually to Christchurch, New Zealand, for a brief stopover before proceeding to the U.S. Antarctic station McMurdo. This part of the narrative and photos brought back many memories of when I traveled the same route to Christchurch, on the same type of aircraft, in 1960 and later years. Much has changed since then with the advent of jet aircraft, and commercial airlines now provide the itineraries and schedules.

The emphasis on photo subjects and text is Navy-oriented, with bits of research and wildlife mixed in. The author was ferried around much as journalists and photographers and DVs (Distinguished Visitors) or VIPs (Very Important Persons) are hosted today. Visits to the neighboring Scott Base (New Zealand), the South Pole, the historic huts of Scott and Shackleton on Ross Island, and the McMurdo environs are topics for photos and narrative. The Navy's presence as a support unit for science ended in 1997; it was replaced by an all-civilian contractor company to provide the facilities and support required for the research funded by the U.S. National Science Foundation. The value of the book is in the historical aspects of seeing McMurdo in its infancy, shortly after initial construction was completed to make it livable, using mainly Quonset-style Jamesways (an example is shown on p. 46) and other structures known as T-5 buildings. Today there are more than 100 buildings at McMurdo, and the current South Pole station is the third structure to have been erected since the original IGY buildings were placed there. The photo on p. 40 of the "Main Street" at McMurdo, with the Chapel of the Snows at the end of the street and Observation Hill towering above it, tells a great deal about what the station looked like in 1959: a sort of frontier town, as some called it. The ledge halfway up Observation Hill is strangely bare, but a few years later two large buildings were placed there: a nuclear power plant to provide station power and a seawater distillation plant. The former had about a 10-year existence at McMurdo and was removed in 1972. The seawater plant continues to provide fresh water for the station. Other items in the book show landmarks that existed in 1959, but are no longer there. The two Navy ships (YOG class) on pages 67, 69, and 71 were iced in next to the shore to provide fuel storage for the station until tanks could be constructed ashore. One was parked on one side of Hut Point Peninsula, and one on the other, a short distance from Scott's 1901 Discovery expedition hut (p. 73). They were there in 1960, when I first saw them, but were gone the following year. One of them apparently was freed in a storm that broke it loose from the ice; it drifted away to sea and was never seen again.

The author has a successful record of producing other photography books recording his world travels, and I expect that more are coming. The endorsements included in the preface by Caroline Alexander (author of several international best-sellers, including *The Endurance: Shackleton's Legendary Expedition*) and the introduction by Guy Guthridge (manager of NSF's Polar Information Program, now retired after 35 years) speak for themselves. Both speak well of the author and his dedication to putting into print what will add a new dimension to our knowledge of America's "Deep Freeze" programs. So what makes this book different from numerous others about the same time period? The value of the book is in its historical content, some of which is included in other works, but it is presented here in an attractive sequence of events. The photographs have excellent resolution and in many respects tell the story of U.S. presence in Antarctica in 1959. Historians and Antarctic veterans, both Naval and civilian, from this time period will find a great deal to reminisce about, and polar history buffs will also value this book. The map and satellite image of the McMurdo Sound area, Ross Island, and the Dry Valleys in the inside covers are beneficial for sorting out places the author mentions.

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**FROZEN IN TIME: PERMAFROST AND ENGINEERING PROBLEMS.** By SIEMON W. MULLER. Edited by HUGH M. FRENCH and FREDERICK E. NELSON. Reston, Virginia: American Society of Civil Engineers, 2008. ISBN 78-0-7844-0989-3. xxiv + 280 p., maps, b&w illus., appendices, select bib. Softbound. US\$85.00.

Although the lag time between a book's completion and its publication often seems extreme (especially to authors), there are few examples of delays as long as 50 years. However, such has been the case for Dr. Siemon William Muller's book about permafrost, the manuscript of which he set aside in the early 1960s. It is not surprising, when one couples such a long delay with the nature of the topic, that the editors (Hugh French and Frederick Nelson—both permafrost experts) chose to title it *Frozen in Time*.

To understand the *raison d'être* of *Frozen in Time*, it is necessary to examine Siemon (Si) Muller's background and qualifications. By 1940, the year he turned 40, he had spent nearly half of his life growing up in Russia, with a short span in China, where he learned English; he spent most of the last half (first as a student, then as a faculty member until his death in 1970) at Stanford University, where as a geologist he became a highly respected member of the scientific fraternity. His reputation and scientific acumen, his ability as a field geologist, and his fluency in Russian made

him an ideal candidate for tackling the problems faced by engineers in the areas of North America dominated by frozen ground.

In contrast to the relative dearth of reports on frozen ground in North America prior to WW II, a vast literature on the engineering aspects of permafrost (a term generally credited to Muller) was available in Russian. Beginning in 1942, Muller delved into the relevant Russian literature held by the Library of Congress and the U.S. Geological Survey's library so that he was able to furnish the government an engineering field guide and a technical report about permafrost by 1943. Although originally classified, the report was later published for general distribution by J.W. Edwards, Inc. It is entitled *Permafrost or Permanently Frozen Ground and Related Engineering Problems* (Muller, 1947) and is "now regarded as the first book on permafrost written in North America" (p. xx).

After Muller's service to the engineering community, he returned to his "preferred" endeavors of teaching and research (mainly paleontology and stratigraphy). Nonetheless, he maintained a sufficient interest in permafrost to track the increasing volume of information about it being produced in the United States and Canada, as well as in the Soviet Union, between 1943 and 1963. The 1963 manuscript, now published as *Frozen in Time*, is basically an update of his earlier publications. Not surprisingly, it is very similar in organization and contains many of the same illustrations, diagrams, and tables, updated where appropriate.

After a Dedication (p. v–vi) by Siemon Muller's son (Eric Muller) and brief Acknowledgments (p. vii), French and Nelson provide a well-crafted Introduction (p. ix–xxiv). In it they give a brief history of Muller's life, an analysis of his contributions to permafrost science, and details about the manuscript. A section on terminology includes a discussion about the word "permafrost" itself. They close their comments with reasons why Muller's work (after some 50 years) deserved publication. Reasons they offer include that it is "an important historical document," that it "contains information and examples that are still relevant today," that the "text was ahead of its time," and that it "provides a rare opportunity to compare the states of English- and Russian-language permafrost science" (p. xx). This reviewer agrees on all counts.

Muller's text, only slightly rearranged by French and Nelson, is divided into three substantive parts: Part 1: "Introduction," Part 2: "Permafrost Science," and Part 3: "Permafrost and Engineering Problems." In addition there are a reference section, three appendices (including a glossary), and an index.

Part 1 (p. 1–22) introduces the reader to Muller's definition of the term "permafrost," analyzes the nature of frozen ground investigations to date (i.e., early 1960s), and provides a lengthy section on terminology. The state of research on permafrost in Muller's day was such that he "faced the critical problem of having no suitable terminology in the English language to express various concepts and phenomena" (p. 13). Thus, after a critical analysis of 37 of the most